United States Environmental Protection Agency

Solar Power on Closed Landfill in Houston

Sustainability Pilot Background

EPA's Brownfields Sustainability Pilots provide technical assistance to assist communities in achieving greener, more sustainable results when redeveloping brownfields. These pilots also provide models for other communities across the country.

EPA provided the City of Houston with technical assistance for the redevelopment of a 300 acre former landfill located near downtown. EPA provided an analysis of the environmental, engineering and regulatory considerations associated with building a ten megawatt solar plant on the former landfill. EPA support also helped the city analyze the potential level of solar energy production and review the financial feasibility of the solar project. This project is expected to spur a local market for solar energy systems and create jobs in the renewable energy field. In addition, project implementation will reduce the city's greenhouse gas emissions by providing an alternative source of power for municipal operations.

Holmes Road Landfill Background

The City of Houston closed the Holmes Road Landfill in the 1970s, and a state mandated cap was installed. Over the past 30 years the site remained idle, even as potential redevelopment plans—including at one point a municipal golf course—materialized and faded. Ultimately, Houston's abundant sunshine and the former landfill's location near existing power distribution lines led to recognition of the site's potential for a solar power generation project. To assist their efforts, the city requested technical assistance from EPA.

Project Highlights

EPA's technical assistance to the City of Houston included an analysis of environmental conditions, preliminary engineering designs, solar photovoltaic (PV) system conceptual design and specifications, solar farm turn-key costs, estimates of solar system output potential, and economic valuations. These analyses provided the city with current and accurate information on the associated costs, benefits, and regulatory requirements for building a solar farm on a former landfill owned by the city.

The technical assistance included:

- An on-site photovoltaic project assessment
- Regulatory assessment
- Site engineering assessment
- Determination of PV system size, conceptual design elements, and specifications
- Development of installed cost estimates for the solar farm
- Economic analysis of the proposed solar farm's characteristics

The City of Houston conducted a request for proposals and received bids from 11 companies. In September 2009, the city selected NRG Energy Inc. to develop the solar farm. After designing and building the solar power farm, NRG will enter into a long term power purchase agreement with the city to sell the solar generated power.

Based on the modeled output derived from the technical assistance, the solar farm will generate over 12.5 million kilowatt hours (kWh) annually accounting for approximately one percent of the city's annual energy purchases. The system itself will have a lifespan of 30 years and carries with it an operational and maintenance cost of approximately $0.005 per kWh. The city is working with the U.S. Business Council for Sustainable Development to assist with the development of a project master plan. Current plans are for completion of the ten megawatt solar farm by 2010.

Challenges and Lessons Learned

Overgrowth and Cap Depth Inconsistency

Since the landfill cap was installed in the mid 1970s, the site became overgrown with large trees and brush. In addition to the added cost of clearing the site of this growth, the cap depth is variable, complicating construction, tree removal, and site grading as consideration must be taken to ensure the cap's integrity. This may require, for example, that tree roots extending into the subsurface landfill waste be left in place and covered. Approaches include moving soil from areas where cap depth is greater or to bring in additional soil to make the overall cap depth more consistent.

The Holmes Road Landfill site before renovation.

Distribution Line Capacity

Utility distribution lines are located adjacent to the landfill on three sides. Studies determined that the most viable location for the solar farm would be on the south side, which has the highest utility distribution capacity. However, further investigation into the actual carrying capacity of these south side distribution lines needs to be conducted.

Constant Communication Among All Stakeholders

For this project, frequent communication among all stakeholders—the city, state, EPA, and consultants—was essential to achieving positive results. The open communication maintained through multiple stages of technical assistance and analysis made successful completion of the solar plant more likely.

Sources for Additional Information

For more information on this project, please see the full Houston Solar project technical assistance report at:
http://www.epa.gov/brownfields/sustain_plts/factsheets/houston_solar.pdf

Additionally, please see:

Action Plan for the Beatty Area, Nye County, Nevada, Renewable Energy Power Park
www.epa.gov/aml/revital/msl/pdfs/beatty.pdf

Regional Contact Information

For more information on the Houston Solar Brownfields Sustainability Pilot project, please contact:

Rob Lawrence
EPA Region 6
214-665-6580

lawrence.rob@epa.gov